

**Taxonomic studies on the *Callophrys suaveola* STAUDINGER, 1881 - species group:
a new species from Central Afghanistan**

(Lepidoptera, Lycaenidae)

by

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Summary: A new species, *Callophrys afghana* spec. nov. from Central Afghanistan (Bamian Province) is described and illustrated. The most allied species is *C. titanus* ZHDANKO, 1998, differences were found in genitalia of ♂♂ and ♀♀. The discovery of the new species in this region is very important in the zoogeographical point of view.

***Callophrys afghana* spec. nov.** (figs. 5-8)

Holotype ♂: Central Afghanistan, Bamian Province, 10 km S Bamian, Hushkak vill., 2600-2800 m, 29.-30.V.2010, O. PAK & E. IVANOVA leg. Paratypes (5 ♂♂, 1 ♀): 3 ♂♂, 1 ♀, the same data, all O. PAK & E. IVANOVA leg.; 2 ♂♂, the same location, 20.V.2010, I. PLJUSHTCH leg. The holotype is deposited in the collection of the Zoological Museum of Moscow State University (ZMMU); the paratypes are in the collections of the authors.

Description. ♂ (figs. 5, 6): Antennae black, white-ringed at bases of segments, club dark, its base below white, terminal segments (apiculus) brown. Eyes brown with small white hairs, surrounded by white strip ahead and white and green scales behind. Frons green with white hairs, top of head with green scales and greenish hairs. Palpi: 2nd segment black with green scales and white and black hairs on the outside and white hairs on the inside; 3rd segment black with white hairs on the top. Thorax: upperside black with grey hairs, underside green with white hairs. Legs white with black scales and white hairs. Abdomen: upperside brown, underside grey with grey hairs.

Upperside (fig. 5). Forewing: ground colour brown, varying from pale to dark brown; basal area overlaid by large brown scales; costal edge with yellowish scales; veins and outer margin marked by dark brown scales; inner margin and base of space 1a covered by brown hairs. Androconial spot large, varying in colour from grey to black. Fringe dirty-white, with brown and dark-brown scales at the base. Hindwing: slightly wavy between veins 1b - 5; ground colour the same as on forewing; spaces 7 - 8 and half of space 6 covered by grey scales; cell covered by grey scales at the base; spaces 1a and 1b covered by pale grey scales; basal and discal area covered by greyish-brown hairs; veins and outer margin marked by dark brown scales; fringe the same as on forewing, chequered with dark scales along veins. Anal lobe not developed; anal angle with small brush of long dark scales. Outer margin (termen) beginning from V2 and inner margin (dorsum) are covered by long white hairs.

Underside (fig. 6). Forewing: ground colour pale green with grey scales, except of spaces 1a and 1b which are grey; basal area of wing with emerald-green scales and rare greenish hairs. Spaces 1a and 1b grey, distal part of space 1b with green scales. Costa with yellowish scales. Postdiscal row of white spots reduced in the holotype specimen, present as small groups of white scales in some of the paratypes. Hindwing: ground colour the same as on forewing but emerald-green scales cover basal area and part of discal area of wing; almost the whole wing covered by greyish-green hairs, more intensely in basal area. Postdiscal row of white spots present in spaces 2 - 8 in the holotype, in the paratypes more or less reduced. Forewing length 14 mm in the holotype and the paratypes.

♂ **genitalia** (fig. 1): Uncus deeply divided by tegumen, as broad as 0,7 of width of vinculum in ventral view, with well-developed invad lobes; falces (subunci) slender, oblique, crossing at sharp angles. Clasps long, basally wide at 3/4 of the length, distally narrowed. Saccus long, triangular (one specimen with spoon-like top of saccus), as long as 1/3 of the general length of genitalia. Aedeagus slender, 1,6 times longer than the general length of genitalia, cornuti strongly serrate.

♀ upperside (fig. 7): The single ♀ is similar to the ♂♂ in general characters but smaller (13 mm), margin of forewing rounded (♂: margin of forewing straight). Underside (fig. 4): spotting pattern reduced (small groups of white scales present in space 1 and space 7).

♀ **genitalia** (fig. 8): papillae anales conic, small, hairy; apophyses posteriores straight, flat, 1,5 much longer than the length of papillae anales. Antrum plate-like, with strongly reduced lateral lobes, central lobe with small hollow. Ductus bursae strong, extending basally, 1,5 times much longer than the length of antrum from top of central lobe to base. Corpus bursae membranous with granulous surface, bears two signa, each with two unequal spines.

Differential diagnosis and discussion. The new species belongs to the *C. suaveola* STAUDINGER, 1881-species group and shares the wing pattern and the structure of genitalia characterizing this group:

- absence of the anal lobe on hindwing;
- pale green underside with more or less reduced row of postdiscal white spots;
- whitish fringes and hairs on wings;
- yellowish costa of forewing;
- slender ♂ genitalia with thin saccus and long clasps, uncus deeply divided by tegumen;
- ♀ genitalia with almost or completely reduced lateral lobes of antrum and strong ductus bursae.

Callophrys afghana spec. nov. is most closely related to *C. titanus* ZHDANKO, 1998 (figs. 1-4).

Status of *C. titanus* ZHDANKO from Ghissaro-Darvaz and Pamiro-Alai still is unclear. TEN HAGEN & MILLER (2010) synonymized this species with *C. suaveola* STGR. on a base of absence of differences in sequences of COI gene of two species. But examination of specimens of *C. titanus* ZHDANKO from different parts of its areal shows that there are a lot of valuable constant differences in the structure of genitalia, shape and colouration of wings in *C. titanus* ZHDANKO. Another reason to consider it as a distinct species

is a zoogeographical reason: it seems to be unreal that one and the same species inhabits vast territory from Altai Mts. on the north (GORBUNOV, 2001) to Pamirs in the south (ZHDANKO, 1998). Moreover, the host plant of *C. suaveola* STGR. is *Ferula* spp., but *C. titanus* ZHDANKO uses *Rheum* spp. as a host plant (ZHDANKO, 1998). To clear the situation with *C. titanus* ZHDANKO, new studies based on sequences of nuclear and ribosomal genes are required. Here we treat *C. titanus* ZHDANKO as a distinct species from the *C. suaveola* STGR.-species group.

External morphological characters of *C. afghana* spec. nov. and *C. titanus* ZHDANKO are exceeded by the individual variability (except of forewing length - 13-14 mm in the new species; 16-18 mm usually in *C. titanus* ZHDANKO - and somewhat more pale green on the underside of the hindwing in the new species). The main morphological differences were found in the structure and size of the ♂ and the ♀ genitalia. Comparison of the ♂ genitalia of *C. titanus* ZHDANKO (fig. 3) and the new species shows that the latter has very well developed membraneous invaginated lobes of vinculum (which are absent in *C. titanus* ZHDANKO), well developed lobes of uncus (less developed in *C. titanus* ZHDANKO), uncus more slender (0,7 of the width of vinculum against 0,8 in *C. titanus* ZHDANKO), its shape different in lateral view, clasps wider in the new species (thinner in *C. titanus* ZHDANKO), shape of clasps different, aedeagus broader, cornuti thinner with stronger serration. The shape of the ♀ genitalia differs in comparison with *C. titanus* ZHDANKO (fig. 4): papillae anales small and broad, apophyses posteriores broader, antrum small, its length is equal to width (antrum larger and wider in *C. titanus* ZHDANKO); ductus as wide as in *C. titanus* ZHDANKO but shorter, corpus bursae with signs of different shape bearing unequal spines.

The new species was found on an arid stony slope with *Rheum* sp. (figs. 13, 14) - probably its host plant.

The new species may be regarded as the second link (with the new species from South Iran, being described separately, as the first link) between Asian species of the *C. suaveola* STGR.-group (*C. danchenkoi* ZHDANKO from the east and *C. titanus* ZHDANKO and *C. suaveola* STGR. from the north-east). The new species prefers higher altitudes than *C. titanus* ZHDANKO (ca. 3000 m in spite of 1500-2000 m), the localities of the new species are isolated, both from *C. titanus* ZHDANKO and the new species from Iran (which prefers altitudes about 3000 m, too) being separated by mountain ridges, river valleys and plains. One of the specimens figured in SAKAI (1981, pl. 46: 17) as «*Callophrys rubi* (LINNAEUS, 1756)» from Auchakan (Logar Prov., on the south-east from the type locality of the new species) probably conspecific with the new species. The specimens shown in figs. 16 and 18-20 from Paghman Mts./near Kabul on the east side from the type locality of the new species and Wardak on the south-east side from the type locality of the new species, have serrated hindwings and so they are probably conspecific with *C. naderii* TEN HAGEN, 2008, belonging to the *C. rubi* (L.)-group of taxa. TEN HAGEN (2008) attributes 1 ♂ from Auchakan to *C. naderii* TEN HAGEN. Moreover, the description of specimens from Paghman Mts. mentioned in HEYDEMANN (1954) as «*Callophrys mystaphia* MILLER, 1913» totally corresponds to our description of *C. afghana* spec. nov. Thus we can suppose that the new species inhabits mountainous regions of central, eastern and south-eastern parts of Afghanistan. We can not exclude that the new species will be found in mountains of the western part of the country (Ghor and Oruzgan Prov.), too.

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References

- GORBUNOV, P. Y. (2001): The butterflies of Russia: classification, genitalia, keys for identification (Lepidoptera: Hesperioidea and Papilionoidea). - Ekaterinburg: Thesis.
- HEYDEMANN, F. (1954): Beitrag zur Lepidopteren-Fauna Afghanistans. - Z. Wien. Ent. Ges. **39**: 422-423, Wien.
- SAKAI, S. (1981): Butterflies of Afghanistan. - Kodansha, Tokyo (in Japanese).
- TEN HAGEN, W. (2008): Beitrag zur Kenntnis des Genus *Callophrys* BILLBERG, 1820: eine neue Art aus Südiran (Lepidoptera: Lycaenidae). - Nachr. Ent. Ver. Apollo N.F. **29** (1/2): 9-14, Frankfurt am Main.
- TEN HAGEN, W. & M. A. MILLER (2010): Molekulargenetische Untersuchungen der paläarktischen Arten des Genus *Callophrys* BILLBERG, 1820 mit Hilfe von mtDNA-COI-Barcodes und taxonomische Überlegungen (Lepidoptera: Lycaenidae). - Nachr. Ent. Ver. Apollo N.F. **30** (4): 177-197, Frankfurt am Main.
- ZHDANKO, A. B. (1998): New blue butterfly species from the genera *Callophrys* BILLB. and *Polyommatus* LATR. (Lepidoptera, Lycaenidae) from Asia and the Caucasus. - Vestnik Kazakh. State University ser. biol. **5**: 46-52, Almaty (in Russian).

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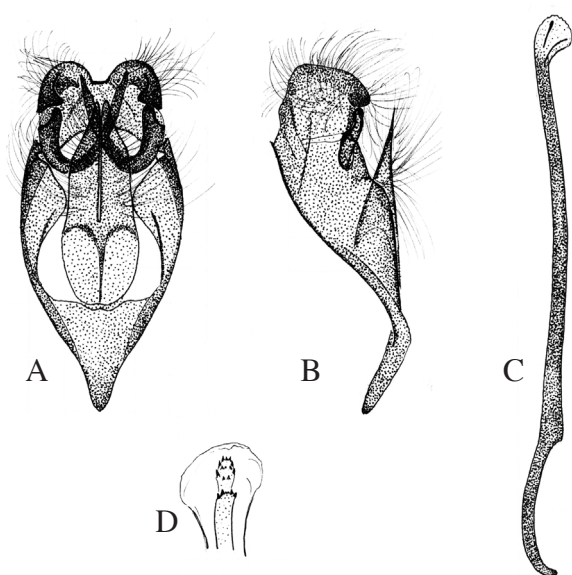


Fig. 1: *Callophrys afghana* spec. nov., ♂ genitalia (A - ventral view, B - lateral view, C - aedeagus, lateral view, D - cornuti, ventral view).

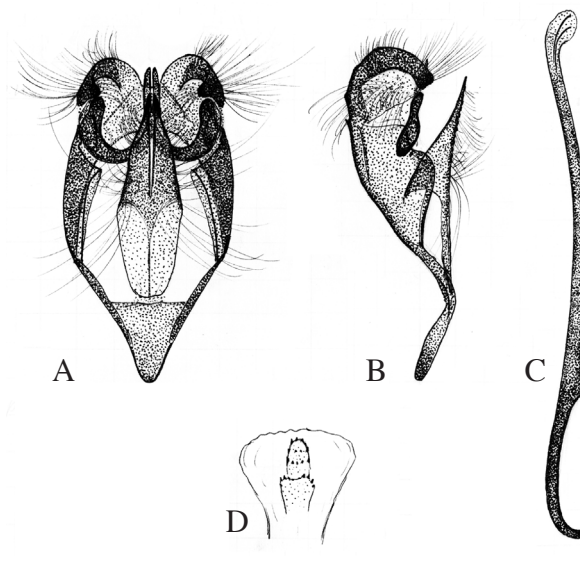


Fig. 3: *Callophrys titanus* ZHDANKO, 1998, ♂ genitalia (A - ventral view, B - lateral view, C - aedeagus, lateral view, D - cornuti, ventral view).

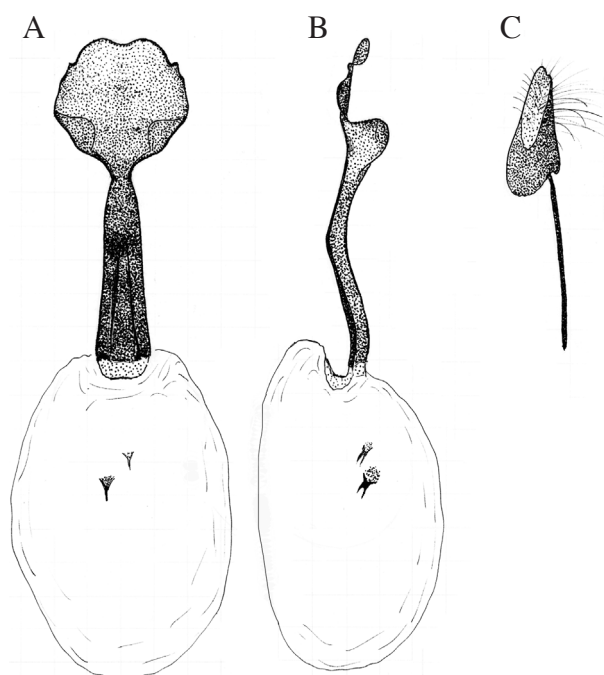


Fig. 2: *Callophrys afghana* spec. nov., ♀ genitalia (A - antrum, ductus bursae and corpus bursae with signa, dorsal view, B - id., lateral view, C - papilla analis and apophysis posteriorum).

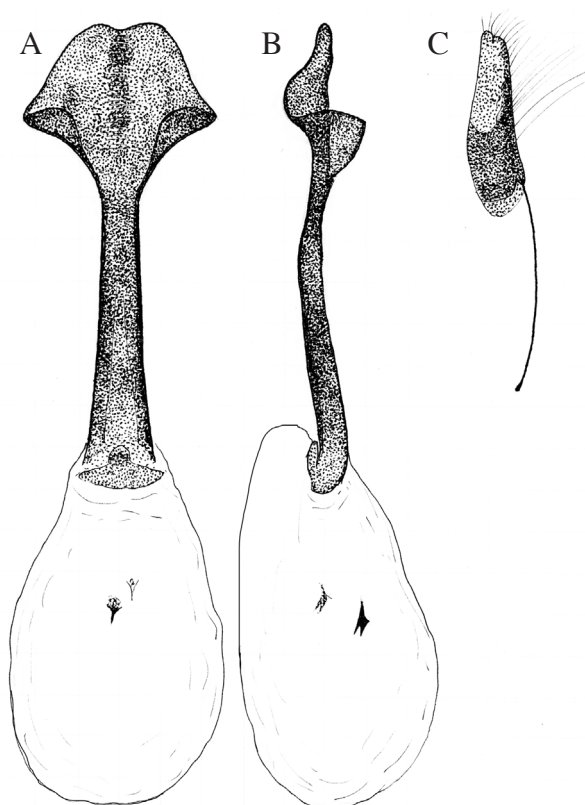


Fig. 4: *Callophrys titanus* ZHDANKO, 1998, ♀ genitalia (A - antrum, ductus bursae and corpus bursae with signa, dorsal view, B - id., lateral view, C - papilla analis and apophysis posteriorum).

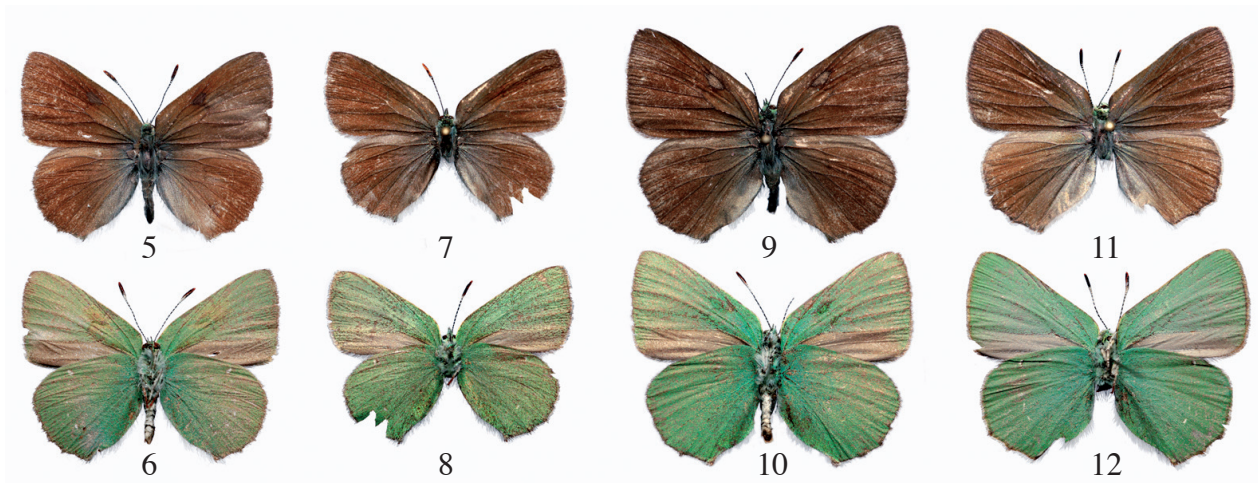


Fig. 5-8: *Callophrys afghana* spec. nov., Central Afghanistan, Bamian Province, 10 km S Bamian, Hushkak vill., 2600-2800 m, 29.-30.V.2010, O. PAK & E. IVANOVA leg. (5,6) holotype ♂, ZMMU, (7, 8) paratype ♀, coll. ANATOLY V. KRUPITSKY.
 Fig. 9-12: *Callophrys titanus* ZHDANKO, 1998, Tadjikistan, Peter the Great Range, Dzhirgetal dist., vic. of Mingbulak vill., 1500 m, 20.-24.V.2011, A. ZUBOV leg. (9, 10) ♂, (11, 12) ♀, coll. ANATOLY V. KRUPITSKY,
 Fig. 13, 14: Habitat of *Callophrys afghana* spec. nov., Central Afghanistan, Bamian Province, 10 km S Bamian, Hushkak vill., 2800 m.